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Scottish mortality rates 2000–2002 by deprivation and small area population mobility☆

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Abstract

Despite recent increases in life expectancy, inequalities in mortality in Scotland have been widening. Previous research has suggested that one of the potential drivers of geographical inequalities in health is the process of selective migration. Although support for the effect of selective migration on widening geographic inequalities in health has been mixed, several studies have shown that people in good health move away from deprived areas while people in poor health move towards more deprived areas. In this paper, we examine mortality rates in Scotland by area deprivation and population mobility. Previous research in Scotland has shown that the relationship between population mobility and migration disappears once deprivation is accounted for. However, the authors measure population mobility over a longer time period than we do here and at a different geographical level. We consider small area population mobility on the basis of moves made in the year prior to the 2001 Scottish census. Areas were classified as one of four types: decreasing, increasing or stable (with high or low turnover). Mortality rates, calculated for the period 2000–2002, were found to be highest in deprived areas that had declined in population over the previous year. In the most deprived quintile, the causes of death contributing disproportionately to the excess mortality in decreasing areas were causes linked to alcohol and drug use, suicides and assault. Focussing on those individuals in the most deprived areas who live in areas that are declining in population could help to reduce widening inequalities for these causes of death. This work shows the extent to which population migration can influence small areas over a relatively short time period and gives some insight into potential factors, not measured by traditional indices of area level deprivation, which may lead to differences in the health status of areas.

Research highlights

► Scottish mortality rates were highest in deprived areas that declined in population in the year before the 2001 census. ► Excess mortality was due to causes linked to alcohol and drug use, suicides and assault. ► Focussing on individuals living in these areas could help to reduce widening inequalities for these causes of death.

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Keywords

Migration; All-cause mortality; Cause-specific mortality; Health inequalities; Area level deprivation; Scotland; UK

Introduction

Life expectancy in Scotland has been steadily improving in recent years; however, mortality rates in Scotland remain high (10.8 per 1000 in 2006) compared to the UK as a whole (9.7 per 1000 in 2005) and to the rest of Europe (9.1 per 1000 in 2005; Scottish Executive, 2008). Over the last two decades, inequalities in mortality rates in Scotland have not only persisted but have been increasing (Leyland, Dundas, McLoone, & Boddy, 2007). This growing inequality can be explained, in part, by the greater reduction in mortality rates for those in the least deprived areas compared to those in the most deprived areas. Another explanation relates to selective migration. Areas change in their composition over time as people migrate between areas (O'Reilly & Stevenson, 2003); if the characteristics of migrants differ from those who remain resident in the same area then the characteristics of the areas themselves may change (Boyle, Norman, & Rees, 2004; Brimblecombe, Dorling, & Shaw, 2000).

Migrants differ from non-migrants in terms of a number of factors (Champion, Fotheringham, Rees, Boyle, & Stillwell, 1998; Lewis, 2003) including age and health status. Young migrants, particularly those moving long distances, are healthier than non-migrants of a similar age (Bentham, 1988) while older migrants often move to receive care from health providers and family. On the whole, the health of migrants tends to be better than average and this could lead to mortality and illness rates reducing in areas that increase in population size, and mortality and illness rates increasing in areas that experience population decline. In recent years, populations have been increasing in affluent areas and declining in deprived areas. This could lead to the health gap widening over time as healthy people move into more affluent areas while those in poor health get left behind. Such population redistribution could mask an overall improvement in health that would have been observed had everyone remained in the same place (Norman, Boyle, & Rees, 2005).

Recent research in New Zealand found evidence that the migration patterns of smokers had a significant effect on widening geographical inequalities in health over the long term (Pearce & Dorling, 2010) while research in Norway (Piro, Naess, & Claussen, 2007), Finland (Martikainen, Sipila, Blomgren, & van Lenthe, 2007), and Northern Ireland (Connolly & O'Reilly, 2007) found little support for the effect of selective migration on widening geographic health inequalities. In Britain, it was concluded that selective migration in England and Wales could not explain the geographical pattern of mortality from cardiovascular diseases (Strachan, Leon, & Dodgeon, 1995); however, a recent study observed that while healthy people have been moving towards less deprived areas, migration from less to more deprived areas was selective of people in poor health (Norman et al., 2005). The authors suggest that this could lead to the relationship between deprivation and health strengthening over time. In Tayside, Scotland, research by Cox, Boyle, Davey, and Morris (2007) observed that people who were living in deprived areas were not only more likely to develop diabetes, they were also more likely to remain in areas that became more deprived. These findings also support the idea that mobility, or in this case immobility, strengthens the relationship between deprivation and health. Other research in Scotland found that the association between population migration and mortality disappeared once deprivation was accounted for (Exeter, Boyle, Feng, & Boyle, 2009; Exeter, Feng, Flowerdew, & Boyle, 2005). The relationship was examined for the whole of Scotland and

for the West of Scotland respectively. Both papers analysed population change over a 20-year period (1981–2001) and used geographical regions that were designed to be consistent areas through time (CATTs) (Exeter, Boyle, Feng, Flowerdew, & Schierloh, 2005). Inter-census boundary changes have often restricted the use of smaller areas, which are more susceptible to boundary changes, to investigate changes in health over time. However, CATTs, with an average population size of around 500 people (min: 50, max: 18,510 at the CATT2 level), allow reliable comparisons of data from the 1981, 1991 and 2001 census.

In this paper we investigate population change in Scotland over a much shorter 1-year period using the census question on usual address one year ago. Others (see, for example, Bailey & Livingston, 2008; Bentham, 1988; Boyle, Norman, & Rees, 2002) have also used this approach. Our choice of geographical scale is less restricted, therefore, as we are not comparing areas over time. We use output areas (OAs) which have an average population size of 119 people, allowing the extent of population change in Scotland to be examined at a more detailed level. OAs are the smallest area of UK census geography and are the building blocks from which higher geographies are built. As well as being designed to be as socially homogenous as possible, they have populations that are approximately similar in size (min: 50, max: 2357). A high proportion of moves in Scotland in the year before the census were local moves (Fleming, 2005); however, we can reasonably assume that most of these were between, rather than within, OAs. This means that we will capture the vast majority of moves made (although multiple moves during the year will not be accounted for).

The aim of our work is to examine the relationship between small area population mobility, area deprivation and mortality (all-cause and cause-specific) in Scotland. We have previously considered the relationship between population mobility, area deprivation and self-reported limiting long term illness (LLTI) (Brown & Leyland, 2009). We found that illness rates were highest in deprived areas in populations that had decreased by at least 10% in the year prior to the 2001 census. Repeating the analysis for mortality will allow further insight into how the relationship between population mobility, deprivation and health in small areas of Scotland varies depending on the health measure used. Some caution should be taken when making direct comparisons between our previous analysis and the present analysis as there are differences in the methodology used in both papers. Firstly, the exclusion of communal establishment (CE) residents is handled differently. Secondly, census based Carstairs deprivation scores are used here to measure area level deprivation instead of the Scottish Index of Multiple Deprivation (SIMD). The next section describes these issues in more detail. Our specific objectives in this paper are as follows:

- **(i)** To categorise OAs as one of four population mobility area types on the basis of moves made in the year prior to the census and examine their distribution across deprivation quintiles.
- **(ii)** To compare the mortality rates of areas, by population mobility and area deprivation.
- **(iii)** Where mortality differences exist, to investigate the causes of death driving the association between population mobility, area deprivation and mortality.

Data and methods

Population

In 2001, Scotland's population was just under 5.1 million. Scotland has 42,604 OAs ranging in size from 50 people to 2357 people (average population: 119). The few larger OAs are mainly communal establishments (CEs), e.g. large hospitals and prisons. In 2001, there were 86,006 CE residents in Scotland (1.7% of Scotland's population). In total, 6.1% of all OAs in Scotland had at least one CE resident (2% of OAs had more than 20% of their population

living in CEs and 0.3% of OAs had more than 50% of their population living in CEs). CE residents have poorer health on average than household residents. At the census in 2001, 57.8% of all communal establishment residents reported having a LLTI compared to 19.7% of all private household residents. As a result, areas with a high proportion of CE residents may have higher than expected illness or mortality rates. In our previous analysis (Brown & Leyland, 2009), we were able to use census data to distinguish between those in households and those in CEs who reported a LLTI. The census defines a person as being CE resident if they have been living, or intend to live, in the establishment for six months or more. The General Register Office for Scotland (GROS) death certificates, however, record an institutional postcode where an individual has been resident in a CE for a period of more than 12 months. For less than 12 months, a previous home postcode is recorded. Since our measure of population mobility will be based on household moves only and the definition of a CE resident varies between the census and death records, we take a different approach to the exclusion of CE residents in this paper. Here, we exclude all OAs with at least one CE resident at the time of the census in 2001. The remaining 40,026 OAs have an average household population size of 117 (min: 50, max: 498).

Mobility

Population mobility is assessed in Scotland at the OA level using 2001 census data. At the census respondents were asked ‘What was your usual address one year ago?’ Just under 12% of people resident in Scotland had moved in the previous year (Fleming, 2005). Of this figure, around 80% had moved from another Scottish address. In the UK, the mobility rate for CE residents was around four times higher than for household residents (Bailey & Livingston, 2005). Therefore we assess population mobility on the basis of household resident moves only. For those who left the UK in the year prior to the 2001 census a UK census form would not have been completed. We exclude those who moved to Scotland from abroad (just under 29,000 people) and restrict analysis to moves within the UK only. Based on movement within the UK, OAs were classified as one of four population mobility area types: as a stable population (<10% total change) with low or high turnover, as an increasing population (10% + net increase), or as a decreasing population (10% + net decrease). Change was measured at the 10% level in order to make comparisons between populations that decreased or increased the most. The majority of OAs will be classified as ‘stable’. Hence to gain some additional information about this large group, we made the distinction between those stable populations that had high or low turnover. Turnover measures moves in and out of an area in relation to the size of the population allowing us to distinguish between stable populations that remained similar in size but where the individuals themselves were changing (stable population with high turnover) and populations that remained similar in size and in composition (stable population with low turnover). Median turnover at the OA level in Scotland in the year before the census was 16%. Therefore stable populations are defined as having high turnover if net population change is less than 10% but turnover is greater than 16%.

Area level deprivation

In our previous analysis we used the Scottish Index of Multiple Deprivation (SIMD) 2004 (Scottish Executive, 2004), available at data zone level, to measure area deprivation. Data zones are aggregations of OAs, with seven OAs on average per data zone. Using a measurement of deprivation calculated at a level higher than OA level may result in small pockets of extreme deprivation in OAs being averaged out. A better approach is to calculate deprivation at the OA level directly. Carstairs scores reflect access to “those goods and services, resources and amenities and of a physical environment which are customary in society” (Carstairs & Morris, 1991) and are derived from a combination of four census variables: unemployment, overcrowding, car ownership and low Social Class (Social Class

IV and V). The scores have been made available at postcode sector level (McLoone, 2004); however, they had to be derived from raw census data at the OA level. Census variables necessary for the construction of Carstairs scores, but which are not provided in standard census tables in 2001, have been commissioned from the General Register Office for Scotland by Richardson (2009) and are available at the OA level from http://hdl.handle.net/10283/19.

Mortality

Information on mortality was drawn from vital events data held by GROS for the period 2000–2002. Over this period, there were 171,649 deaths. Causes of deaths were coded using ICD-10.

Analyses

We rank OAs in terms of their Carstairs score and divided into quintiles (Q1 = least deprived, Q5 = most deprived). Each OA is also categorised as one of four population mobility area types (stable with low turnover, stable with high turnover, increasing or decreasing). Combining these two measures, each OA then belongs to one of 20 (5×4) groups based on their quintile of deprivation and their population mobility area type. Using the European standard population, age groups are aggregated into five-year age bands to calculate directly age-standardised mortality rates for each group of, widely distributed, non-contiguous areas.

Results

Population mobility in Scotland

We considered only those OAs with no CE residents living in them at the time of the census. As a result 2578 OAs were excluded from the study and 40,026 Scottish OAs were analysed. This number is broken down by population mobility area type in Table 1. Table 1 also shows the percentage of areas lying within each quintile of deprivation by population mobility area type. Stable populations with low turnover were equally likely to be found across all quintiles of deprivation while there was a disproportionately high percentage of areas with decreasing populations or stable populations with high turnover within the most deprived quintile.

All-cause mortality

Directly age-standardised all-cause mortality rates 2000–2002 were calculated separately for males and females under 65 years old and aged at least 65 years old (Fig. 1). For males in the younger age group (Fig. 1a), there was a steep all-cause mortality gradient across deprivation quintiles. Within some deprivation quintiles, there were differences in all-cause mortality rates by population mobility area type. These differences were significant in the three most deprived quintiles, with the largest differences observed in the most deprived quintile. In the most deprived quintile, males living in decreasing populations had significantly higher all-cause mortality rates than those living in increasing populations and in stable populations with high turnover. All of these area types in turn had significantly higher rates than those living in stable populations with low turnover. Mortality rates in stable populations with low turnover in the most deprived quintile were also found to be significantly lower than mortality rates in decreasing populations in the next most deprived quintile.

For females under 65 (Fig. 1b) there were significant differences by population mobility area type but only within the most deprived quintile. In the most deprived quintile, mortality rates were significantly higher in decreasing populations than in all other area types.

For those aged at least 65 we also see evidence of differences in all-cause mortality rates, within quintiles, based on population mobility area type. For males (Fig. 1c), there were significant differences by area type in the three most deprived quintiles. For females (Fig. 1d), differences by area type existed in all but the most deprived quintile.

Cause-specific mortality

Large differences in all-cause mortality rates existed between decreasing populations and stable, low turnover, populations in the most deprived quintile. These differences were particularly striking for males and females under 65 years. Excess mortality stood at around 57% for males and 47% for females in the younger age group, and around 14% for males and 16% for females in the older age group when comparing these two area types.

Directly age-standardised cause-specific mortality rates were calculated for the period 2000–2002 for 10 causes of deaths to examine which causes contribute most to the excess in all-cause mortality. Table 2 shows, for males and females under 65, the excess mortality rate and the proportion of the total excess attributable to each cause. Also shown, as a means of contextualising this information, is the overall mortality rate for all deaths in the most deprived quintile and the proportion of deaths in this quintile attributable to each cause. Chronic liver disease, ischaemic heart disease and disorders due to the use of drugs are causes which together explain just under half of the excess in all-cause mortality rates for males. Deaths due to chronic liver disease account for 10% of all deaths in the most deprived quintile but contribute nearly 22% of the excess seen in decreasing populations. Other causes for which the proportion of male deaths in decreasing areas is greater than the proportion of deaths for all areas in the most deprived quintile are disorders due to the use of drugs, suicide, disorders due to alcohol use and assault. Although ischaemic heart disease and cancer mortality contribute about 15% of the excess, this is lower than might be expected given that the two causes account for over 40% of male deaths in the most deprived quintile.

For females under 65, deaths from cancer, suicide and ischaemic heart disease contributed most to the excess mortality between decreasing populations and stable populations with low turnover. While deaths from cancer and ischaemic heart disease contributed to about 45% of all deaths in the most deprived quintile they contributed to only 25% of the excess deaths in decreasing areas.

In the older age group (Table 3), most of the excess mortality between decreasing populations and stable populations with low turnover is due to deaths from cancer and ischaemic heart disease. Together these causes of deaths explain around half the excess mortality for males and around three quarters of the excess mortality for females. For males aged at least 65 we see that 1.4% of all deaths in the most deprived quintile are due to chronic liver disease; however, deaths from chronic liver disease contribute 10.9% of the excess between decreasing populations and stable populations with low turnover.

Discussion

This study examined mortality rates in Scotland during 2000–2002 by small area population change in the year prior to the 2001 census and area deprivation. Compared to areas of comparable deprivation, mortality rates for those under 65 were significantly higher in decreasing populations within the most deprived quintile. Mortality rates of those aged at least 65 were also highest overall in decreasing populations in the most deprived quintile. Studies by Exeter et al. (2009) and Exeter, Feng, et al. (2005) examined population change over a 20-year period in Scotland at CATT level. They found that while there appeared to be a strong relationship between population change and mortality the relationship disappeared

once deprivation was accounted for. The authors suggest that, at that scale of analysis, the relationship between population change and mortality could be an artifact of the relationship between area deprivation and mortality as decreasing populations are most likely to be found in areas of high deprivation. We also found that a disproportionately high percentage of decreasing populations (and stable populations with high turnover) lay in the most deprived quintile. To compare our findings to Exeter et al. (2009) and Exeter, Feng, et al. (2005), we modelled the relative risk of mortality associated with each population mobility area type (in the most deprived quintile), adjusting for age and OA level Carstairs score (results not shown). We found that this explained the relationship between population mobility and mortality in the older age group. The effect of population mobility was somewhat attenuated for males and females in the younger age group; however, mortality rates in decreasing populations remained significantly higher than in stable populations with low turnover.

In their analysis, Exeter et al. (2009) and Exeter, Feng, et al. (2005) split areas into three categories on the basis of population change: decreasing, increasing and stable. However, by further dividing the large stable group into those areas with low and high turnover we were able to see that mortality rates, within deprivation quintiles, tended to be lowest overall in areas that had remained most stable in size and composition. There could be something protective about these populations compared to increasing and decreasing populations and populations that remained stable but that had high turnover. Residential stability leads to lower rates of major depression and schizophrenia (Silver, Mulvey, & Swanson, 2002) and lessens the negative effects of stress on physical health (Boardman, 2004). Chaix, Rosvall, and Merlo (2007) found that residential instability reduced long term survival after myocardial infarction. Living in stable populations may improve social networks and support (Sampson, 1988) which could lead to greater resilience (Tunstall, Mitchell, Gibbs, Platt, & Dorling, 2007). Had we combined our stable populations, the mortality difference between decreasing populations and stable populations may not have been significant after adjustment for deprivation. Other possible explanations for the differences in findings, could relate to the size of the geographical areas analysed or the time period over which population mobility was measured. These are issues which need to be understood better in studies of migration as findings will inevitably depend on one or both of these factors.

Norman et al. (2005) examined the relationship between population mobility, area deprivation and health and considered two health measures: mortality and LLTI. After adjusting for deprivation, they found that population mobility had a significant effect on the health of areas, although findings were stronger for LLTI than mortality. Findings in this analysis were similar to those in our previous analysis (Brown & Leyland, 2009). We observed that both mortality and illness rates varied most, in terms of population change, in the most deprived quintile. In the most deprived areas, mortality and illness rates were highest in decreasing populations and lowest in stable populations with low turnover. Mortality and LLTI rates were highest overall for males under 65 living in decreasing populations in the most deprived quintile. Findings appeared to be slightly stronger for mortality then LLTI although this may be due to methodological differences.

We also examined the causes of deaths that contributed most to the excess mortality rates between decreasing populations and stable population with low turnover in the most deprived quintile. Several studies have examined the relationship between population mobility and cause-specific mortality. Many have found a strong association between population change and mortality (Davey Smith, Shaw, & Dorling, 2001; Molarius & Janson, 2000; Regidor, Calle, Dominguez, & Navarro, 2002), although for some causes of death the association only held for males. Davey Smith et al. (2001) hypothesised that deaths related to social fragmentation (e.g. alcohol, drugs and suicide) would be most strongly related to population change but instead found a stronger association for major causes of death such as

cardiovascular disease and lung cancer. We observed that the causes of death that contributed disproportionately to the excess mortality observed between decreasing populations and stable populations with low turnover were causes linked to alcohol and drug use, suicides and assault. This is in line with the findings of Molarius & Janson, 2000. These causes are already known to be associated with deprivation in Scotland, accounting for much of the socioeconomic inequalities in mortality among young men and women (Leyland et al., 2007). We also found a stronger relationship between population mobility, deprivation and mortality for males than females. Female breast cancer mortality in Sweden was highest in many of the increasing areas (Molarius & Janson, 2000). If female breast cancer mortality is lower in decreasing populations then this will have the effect of reducing the excess mortality observed for females living in decreasing populations.

There are some limitations to our study. Conclusions only reflect the pace of change in Scotland over a short 1-year time period. Areas categorised as increasing or decreasing populations changed considerably (by at least 10%) in the year before the census and it is reasonable to assume that those areas changing in size the most in the short term are the same areas that are changing the most in the long term. We excluded OAs with CE residents from our analysis since they are known to have higher mobility rates and rates of poor health. Deprived areas tend to have a higher proportion of CE residents living in hostels, while less deprived areas have more CE residents living in student halls of residence and defence establishments (Bailey & Livingston, 2007). Hence excluding areas with communal establishment residents will result in OAs across all deprivation quintiles being excluded from analysis. Finally, these conclusions are based on the analysis of areas, not individuals. We do not attempt to examine how the health of individuals who move differs from those who do not move. Rather, the focus is on characterising small areas in terms of population mobility levels and examining the relationship between population mobility, area deprivation and mortality. The same individuals may not be included in both denominators, for example, if they had died at the beginning of the study period or if they died after having moved to a new area following the census.

Mortality rates were highest in decreasing populations in the most deprived quintile. We observed that those causes of death that contributed disproportionately to the excess mortality observed were causes linked to alcohol and drug use, suicides and assault. As such, it may be that our classification of area types is proving a refined or an alternative measure of deprivation. Alternatively, the behaviours associated with these causes of death (including violence, alcohol and drug use) may be driving sections of the population from certain areas, suggesting that population decrease in the most deprived areas is a marker for population behaviour which is leading to higher mortality rates. Initiatives aimed at reducing widening health inequalities for these specific causes of death should consider focussing on those individuals in the most deprived areas who live in areas that are declining in population. This represents only a very small proportion of the Scottish population but appears to be a very high risk group.

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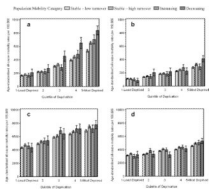

Fig. 1.
Age-standardised all-cause mortality rates (per 100,000 population) for (a) males under 65 years old, (b) females under 65 years old, (c) males aged at least 65 years old and (d) females aged at least 65 years old.

Table 1

Shown is the total number of OAs by each population mobility area type. Also shown is the number of OAs with at least one CE resident and the number with no CE residents. For each population mobility area type, the proportion of OAs with no CE residents is broken down by deprivation quintile (Q1 = least deprived, Q5 = most deprived).

	Number of OAs including and excluding CE residents			% (including no CE residents) in each quintile of deprivation				
	Total	**At least one CE resident (%)**	**No CE residents (%)**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
Mobility category								
Stable – low turnover	21,016	977 (4.6)	20,039 (95.4)	22.2	19.3	20.3	21.2	17.0
Stable – high turnover	16,520	1115 (6.7)	15,405 (93.3)	16.2	20.2	19.7	20.0	23.9
Increasing	3117	210 (6.7)	2907 (93.3)	21.7	20.0	21.1	18.1	19.1
Decreasing	1951	276 (14.1)	1675 (85.9)	14.0	14.4	15.9	17.6	38.1
Scotland	*42,604*	*2,578 (6.1)*	*40,026 (93.9)*	19.5	19.5	19.9	20.4	20.7

Table 2

Shown is the excess mortality rate between decreasing and stable, low turnover, populations in the most deprived quintile and the proportion of the total excess attributable to each cause of death. Also shown is the overall mortality rate in the most deprived quintile and the proportion of deaths attributable to each cause. Rates are for males and females under 65 years old.

Males <65					**Females <65**				
Cause of death*(ICD-10 code)*	**Excess mortality(rate per 100,000)**	***% of all-cause mortality excess***	**Mortality rate (per 100,000) in the most deprived quintile (Q5)**	***% of all-cause mortality rate***	**Cause of death*(ICD-10 code)***	**Excess mortality(rate per 100,000)**	***% of all-cause mortality excess***	**Mortality rate (per 100,000) in the most deprived quintile (Q5)**	***% of all-cause mortality rate***
Chronic liver disease *(K70, K73-74)*	66.9	*21.8*	62.5	*10.1*	All cancers *(C00-97)*	19.8	*15.1*	100.3	*32.4*
Ischaemic heart disease *(I20-25)*	33.5	*10.9*	114.6	*18.6*	Suicide *(X60-84, Y87.0, Y10-34, Y87.2)*	14.0	*10.6*	16.9	*5.5*
Mental & behavioural disorders due to drug use *(F11-16, F18-19)*	33.1	*10.8*	26.5	*4.3*	Ischaemic heart disease *(I20-25)*	13.0	*9.8*	38.4	*12.4*
Suicide *(X60-84, Y87.0, Y10-34, Y87.2)*	30.4	*9.9*	51.5	*8.3*	Chronic liver disease *(K70, K73-74)*	10.4	*7.9*	23.3	*7.5*
All cancers *(C00-97)*	13.8	*4.5*	136.4	*22.1*	Mental & behavioural disorders due to alcohol use *(F10)*	9.5	*7.2*	6.8	*2.2*
Accidents *(V01-X59, Y85, Y86)*	12.7	*4.1*	28.6	*4.6*	Mental & behavioural disorders due to drug use *(F11-16, F18-19)*	7.5	*5.7*	5.1	*1.6*
Mental & behavioural disorders due to alcohol use *(F10)*	11.7	*3.8*	20.7	*3.4*	Accidents *(V01-X59, Y85, Y86)*	5.2	*4.0*	8.3	*2.7*
Assault *(X85-Y09, Y87.1)*	7.2	*2.4*	10.5	*1.7*	Assault *(X85-Y09, Y87.1)*	4.1	*3.1*	2.5	*0.8*
Chronic lower respiratory disease *(J40-47)*	6.7	*2.2*	19.1	*3.1*	Chronic lower respiratory disease *(J40-47)*	4.1	*3.1*	15.6	*5.0*
Cerebrovascular disease *(I60-69, G45)*	1.4	*0.4*	21.3	*3.5*	Cerebrovascular disease *(I60-69, G45)*	1.8	*1.4*	18.9	*6.1*
All other causes	89.7	*29.2*	125.7	*20.3*	All other causes	42.2	*32.1*	73.6	*23.8*
All-cause mortality excess	*307.1*	*100*			*All-cause mortality excess*	*131.6*	*100*		
All-cause mortality rate			*617.4*	*100*	*All-cause mortality rate*			*309.7*	*100*

Table 3

Shown is the excess mortality rate between decreasing and stable, low turnover, populations in the most deprived quintile and the proportion of the total excess attributable to each cause of death. Also shown is the overall mortality rate in the most deprived quintile and the proportion of deaths attributable to each cause. Rates are for males and females aged at least 65 years old.

Males 65+					**Females 65+**				
Cause of death*(ICD-10 code)*	**Excess mortality(rate per 100,000)**	***% of all-cause mortality excess***	**Mortality rate(per 100,000) in the most deprived quintile (Q5)**	***% of all-cause mortality rate***	**Cause of death*(ICD-10 code)***	**Excess mortality(rate per 100,000)**	***% of all-cause mortality excess***	**Mortality rate(per 100,000) in the most deprived quintile (Q5)**	***% of all-cause mortality rate***
All cancers *(C00-97)*	251.2	*26.8*	2100.4	*29.3*	All cancers *(C00-97)*	352.9	*47.1*	1300.1	*27.2*
Ischaemic heart disease *(I20-25)*	154.5	*16.5*	1830.8	*25.5*	Ischaemic heart disease *(I20-25)*	216.8	*28.9*	1078.5	*22.5*
Chronic liver disease *(K70, K73-74)*	102.3	*10.9*	102.6	*1.4*	Chronic lower respiratory disease *(J40-47)*	104.4	*13.9*	372.7	*7.8*
Cerebrovascular disease *(I60-69, G45)*	99.8	*10.7*	663.5	*9.2*	Cerebrovascular disease *(I60-69, G45)*	74.5	*9.9*	550.7	*11.5*
Chronic lower respiratory disease *(J40-47)*	99.7	*10.7*	562.9	*7.9*	Accidents *(V01-X59, Y85, Y86)*	28.1	*3.8*	72.2	*1.5*
Accidents *(V01-X59, Y85, Y86)*	56.2	*6.0*	109.6	*1.5*	Chronic liver disease *(K70, K73-74)*	20.6	*2.7*	38.4	*0.8*
Mental & behavioural disorders due to alcohol use *(F10)*	1.2	*0.1*	29.3	*0.4*	Mental & behavioural disorders due to drug use *(F11-16, F18-19)*	0.0	*0.0*	0.0	*0.0*
Assault *(X85-Y09, Y87.1)*	0.0	*0.0*	0.6	*0.0*	Assault *(X85-Y09, Y87.1)*	0.0	*0.0*	0.0	*0.0*
Mental & behavioural disorders due to drug use *(F11-16, F18-19)*	0.0	*0.0*	0.0	*0.0*	Mental & behavioural disorders due to alcohol use *(F10)*	-2.6	*-0.4*	9.5	*0.2*
Suicide *(X60-84, Y87.0, Y10-34, Y87.2)*	-27.7	*-3.0*	23.2	*0.3*	Suicide *(X60-84, Y87.0, Y10-34, Y87.2)*	-3.8	*-0.5*	8.3	*0.2*
All other causes	199.5	*21.3*	1754.8	*24.5*	All other causes	-41.0	*-5.4*	1355.0	*28.3*
All-cause mortality excess	*936.7*	*100*			*All-cause mortality excess*	*749.9*	*100*		
All-cause mortality rate			*7177.7*	*100*	*All-cause mortality rate*			*4785.4*	*100*